DRAFT

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Plan to Conduct a Risk Assessment
As part of the Confirmation Review Assessment

Background

In light of the recent increased focus on "Mission Success" within NASA, the risk assessment normally associated with the Confirmation Assessment Review will be expanded to include a more formal risk rating assessment comparing the mission under review with all classes of NASA missions.

The mission elements to be addressed by the Review Team shall be as follows:

- Spacecraft, Instruments, ground systems, and operations safety
- Launch vehicle integration
- Launch vehicle mission unique changes and any special issues
- Mission operations and on-orbit checkout
- SOMO/institutional mission operations support, if planned

Review Process Concept

The risk assessment shall critically assess the mission technical implementation and operations from the perspective of looking at what could go wrong and cause the mission to be less than fully successful. Specific key processes planned by the project in the implementation of the mission shall be reviewed. Particular attention should be paid to any critical components or systems, which will be verified by analysis only and not tested before launch. From this information, the Review Team shall identify and document all risk that could be in-line with complete mission success.

Review Process Specifics

The review team shall, to the fullest extent possible within the scope of the Confirmation Assessment Review, address the following:

1. Technical Peer Reviews - -The level, competence and independence of technical peer reviews that were performed or are planned on each of the elements and components.
2. System Level Reviews - - The performance, level and independence of system level reviews that were conducted or are planned.
3. Test and Verification Program - -The level and thoroughness to which the test and verification program is planned. The test and verification program at all levels from black box to spacecraft and integrated mission shall be reviewed. This shall also include the V&V and IV&V processes used on software.
4. Mission Assurance - - The level of mission assurance imposed on the implementation of the mission. This shall include parts usage as well as workmanship standards. It shall also address the software assurance processes implemented or planned.
5. Systems Management and Engineering - - The systems management imposed and implemented within the mission. This shall include the performance and thoroughness of analyses, requirement management, systems engineering, software metrics, configuration management, documentation and technical record-keeping and workmanship and test process management that has been implemented or planned.
6. Staffing - Factors such as staffing and the experience of the implementing organization.

7. I & T Planning - - Plans for the test and integration process of all of the hardware and software elements of the mission. This shall include plans for the review and assessment of all failures and anomalies and their resolution.
8. Operating Time - - Planned failure free hours as well as the total operating time on all mission critical hardware and software before flight.
9. RFA Tracking and Closure - -The plans and results, if any to date, of the technical review process shall be assessed. It shall include an assessment of the planned tracking and closeout of all RFA's.
10. Mission Simulations and Launch Operations - - The amount, level and fidelity of mission simulations and launch/operations training that is planned to be done to prepare the mission for launch and on-orbit operations.
11. FMEA and/or Fault Tree Analysis Plans - - Assess the subsystem level Failure Modes and Effects Analysis (FMEA) and/or any Fault Tree Analysis (FTA).
12. Mission Requirements Verification Matrix - - Evaluate the mission requirements Verification Matrix that shows the verification of the mission level requirements. The fidelity and type of verification shall be assessed.
13. Single Point Failure Assessment - -- Identify all single-point failures and provide a subjective assessment of the probability of each such failure mode causing a mission failure. Also provide adequate rationale to substantiate the subjective assessment.

In performing this task, the Review Team shall do the following:

1. Document the above review investigations in a summary matrix that indicates actual level of performance achieved on each of the above 13 items. This should take into account the level of difficulty and complexity of each mission. Each of these items shall be rated on a scale of 1 to 10 with 10 being a very superior implementation and 7 being judged as nominal expected for assuring a remaining residual risk judged to be categorized as low. Each and every lapse in adequate implementation (a scoring of 6 or lower), even if the overall implementation is judged as being adequate, shall be identified and documented and judged under Item #2 below. Potential viable mitigation of remaining risk shall also be addressed.
2. Ascertain and document all residual risks, judged to be any level higher than low, that are remaining in the mission. Provide recommendations on methods and implementations to mitigate these identified higher-than-low risks. The residual risk rating shall take into account the consequence and the probability of the event. The consequence or criticality should be given a number between 1 to 5 with 1 being the lowest mission impact and 5 is the highest and likewise the probability should be given a number of 1 to 5 where 1 is the lowest probability and 5 is the highest. By multiplying the numbers together for a given risk, a numerical rating is derived. A high risk would be a numerical rating of 16-25, a medium risk of 10-15, and a low risk of 1-9.
3. Assess all single point failure mechanisms and provide a recommendation on the acceptability or non-acceptability, with appropriate rationale for each judgement.
4. Provide a full report of all of the above to the Explorers Project Manager within two weeks of conducting each review. This report shall also have the Project provided FMEA and Verification Matrix attached, if available.
5. An overall mission risk statement, along with the justification for that statement shall be made in the Final Report.